Building Cisco Multilayer Switched Networks
Course Outline

1. Overview of a Campus Network
   - Campus Network Overview
   - Traditional Campus Networks
   - Current Campus Networks
   - The Emerging Campus Network
   - Switching Technologies
   - Basic Layer Terminology
   - Layer 2 Switching
   - Benefits of Routing
   - Layer 3 Switching
   - Layer 4 Switching
   - Multilayer Switching
   - The Hierarchical Model
   - Access Layer
   - Distribution Layer
   - Core Layer
   - Choosing a Cisco Product
   - The Building Block Approach
   - The Switch Block

2. Connecting the Switch Block
   - Cable Media Types
   - Ethernet
   - Fast Ethernet
   - Gigabit Ethernet
   - Subscribing Links
   - Cabling Switch Block Devices
   - Connecting to the Console Port
   - Connecting to an Ethernet Port
   - Configuring Connectivity Within the Switch Block

3. Defining Common Workgroups
   - VLANs
   - Introduction to VLANs
   - Defining VLAN Boundaries
   - End-to-End VLANs
   - Local VLANs
   - Establishing VLAN Memberships
   - Membership by Ports
   - Configuring VLANs
   - Verifying VLAN Configuration
   - VLAN Identification
   - Link Types
   - ISL
   - IEEE 802.1Q
   - Trunk Negotiation
   - Configuring a Trunk Link
   - Creating Trunk Links

- Clearing VLANs from Trunk Link
- Verifying Trunk Link Configuration
- VLAN Trunk Protocol (VTP)
- VTP Overview
- VTP Operation
- VTP Modes of Operation
- Adding a Switch into an Existing Domain
- VTP Advertisements
- VTP Configuration Revision Number
- VTP Configuration Tasks and Guidelines
- VTP Pruning
- VTP Pruning Overview
- Configuring VTP Pruning
- Verifying VTP Pruning Configuration
- Review Questions

4. Managing Redundant Links
   - Overview of Transparent Bridging
   - Introduction to Spanning Tree
   - Bridge Protocol Data Units
   - Electing a Root Bridge
   - Forming an Association with the Root Bridge
   - Spanning Tree Port States
   - Spanning Tree Timers
   - Topology Changes
   - Spanning Tree Example
   - Enabling Spanning Tree
   - VLANs and Spanning Tree
   - Per VLAN Spanning Tree (PVST)
   - Common Spanning Tree (CST)
   - Per VLAN Spanning Tree+ (PVST+)
   - Scaling Spanning Tree in the Campus Network
   - Establishing the Root Bridge
   - Determining the Best Loop-Free Path to the Root
   - Modifying Port Cost
   - Modifying Port Cost by VLAN
   - Modifying Port Priority
   - Modifying Port Priority by VLAN
   - Modifying Spanning Tree Timers
   - EtherChannel
   - Implementing PortFast
   - Configuring UplinkFast
   - Configuring BackboneFast

5. Inter-VLAN Routing
   - Introduction to Inter-VLAN Routing
   - Inter-VLAN Routing Issues
   - Distribution Layer Topology
   - Configuring Inter-VLAN Routing
   - Loading and Accessing the Route Processor

6. Improving IP Routing Performance with Multilayer Switching
    - Multilay2
    - Unsupported Topologies
    - Topology Changes and Routing Impacts

7. Configuring HSRP for Fault Tolerant Routing
    - HSRP Overview
    - Routing Issues in a Redundant Network
    - Utilizing HSRP to Resolve Issues in a Redundant Network
    - HSRP Groups
    - HSRP Operations
    - Configuring HSRP

8. Multicast Overview
    - Introduction to Multicast
    - Unicast Traffic
    - Broadcast Traffic
    - Multicast Traffic
    - IP Multicast Characteristics
    - Addressing in a Multicast Environment
    - IP Multicasting Address Structure
    - Mapping MAC Addresses to IP Multicast Addresses
    - Managing Multicast Traffic in a Campus Network
    - Subscribing and Maintaining Groups
    - IGMP v1
    - IGMP v2
    - Handling Multicast Traffic in a Switch
    - Routing Multicast Traffic
    - Routing Protocols
    - Distribution Trees
    - Multicast Routing Protocols

9. Configuring IP Multicast
    - Planning for Multicast
    - Planning for Multicast
    - Configuring IP Multicast Routing
    - Multicast Routing Protocol Types
    - Outgoing Interface Lists
    - Configuring Multicast Services
    - Configuring a PIM Interface
    - Selecting and Configuring a Designated Router
    - Choosing and Displaying a PIM Neighbor
    - Configuring a Rendezvous Point
    - Auto-RP
    - Defining the Scope of Delivery
    - Verifying Multicast Configuration
    - Enhancing the Route Processor
    - Joining a Multicast Group
    - Manipulating the IGMP Version

- Enabling CGMP
- Enable CGMP on the Router
- Enable CGMP on the Switch
- Enable CGMP Leave
- Verifying CGMP Configuration

10. Controlling Access to the Campus Network
    - Definition of an Access Policy
    - What is an Access Policy?
    - Policies in the Hierarchical Model
    - Access Layer Policy
    - Distribution Layer Policy
    - Controlling Information with Filters
    - Core Layer Policy
    - Review Questions Hands-On Labs Hands-On Lab 1: Plug-and-Play Group switches into a switch block, reset all RSMs and switches, and establish IP connectivity between PCs.

Hands-On Lab 2: Basic Switch Configuration

Login and provide a base configuration for the Catalyst 1900's and Catalyst 5505 Supervisor III cards.

Hands-On Lab 3: Creating VLANs and Trunks

Create multiple VLANs and then trunk between switches. Hands-On Lab 4: Enabling VLAN Trunk Protocol (VTP) Explore the nuances of Cisco's VTP including the effect of different VTP modes, different domain names, and different domain revision numbers. Enable VTP pruning. Hands-On Lab 5: Configuration of Spanning Tree Parameters (STP) Explore the nuances of STP including establishing a root and secondary root bridge, load balancing across redundant links by VLAN, and enabling PortFast. Hands-On Lab 6: Configuration of Fast Etherchannel and UplinkFast Create Fast Etherchannel links between switches for improved performance. Enable UplinkFast to limit network downtime.

Hands-On Lab 7: Configuration of RSFC for Inter-VLAN Routing Configure a Route Switch Module (RSM) for basic Multilayer Switching. Hands-On Lab 8:

Multilayer Switching Basic Configuration Configure a RSM and Catalyst 5505 Supervisor III for basic Multilayer Switching.

Hands-On Lab 9: Multilayer Switching Advanced Configuration Modify Multilayer Switching performance by configuring standard and extended access lists. Modify MLS cache aging for short lived flows. Hands-On Lab 10:

Configuration of Hot Stand-By Routing Protocol (HSRP) Configure Cisco's Hot Stand-By Routing Protocol (HSRP) on 2 RSMs. This provides fault tolerance to end users in the event that a gateway router becomes inoperable. Hands-On Lab 11: Campus Architecture Configuration of the Core (Collapsed Core vs. Dual Core)

Configure and examine two different methods of building a campus backbone Core. Compare traffic convergence characteristics.

Hands-On Lab 12: Managing IP Multicast Streams

Send an IP multicast stream through the network to workstations. Enable CGMP, and configure both PIM Dense Mode and PIM Sparse Mode. Hands-On Lab 13: Configuration Management and Access Control Save and restore switch and router configurations from a TFTP server. Perform password recovery on a Catalyst 1900 and Catalyst Supervisor III. Enable privilege levels on the RSM to limit user control. Apply an access list to filter the advertisements of certain networks.

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